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Continuum Kinetic Plasma Modeling Using a Conservative 4th-Order Method with AMR[1] GENIA VOGMAN, University of California - Berkeley, PHILLIP COLELLA, Lawrence Berkeley National Laboratory — When the number of particles in a Debye sphere is large, a plasma can be accurately represented by a distribution function, which can be treated as a continuous incompressible fluid in phase space. In the most general case the evolution of such a distribution function is described by the 6D Boltzmann-Maxwell partial differential equation system. To address the challenges associated with solving a 6D hyperbolic governing equation, a simpler 3D Vlasov-Poisson system is considered. A 4th-order accurate Vlasov-Poisson model has been developed in one spatial and two velocity dimensions. The governing equation is cast in conservation law form and is solved with a finite volume representation. Adaptive mesh refinement (AMR) is used to allow for efficient use of computational resources while maintaining desired levels of resolution. The model employs a flux limiter to remedy non-physical effects such as numerical dispersion. The model is tested on the two-stream, beam-plasma, and Dory-Guest-Harris instabilities. All results are compared with linear theory.

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